

SECTION 6

RADIATION SAFETY PLAN

NOTE: This radiation safety plan applies only to permitted users, associate users, and laboratories within SNARC. Permits and permit conditions issued by the USDA Radiological Safety Staff (RSS) under the USDA General Radiological License are specific to individual users and laboratories (see Section I.A.1.c). A separate radioactive materials permit and safety plan must be approved for each center/unit within the **SPBL** using radioactive materials. For further information contact USDA/RSS (see Section IV.A for contact information).

I. INTRODUCTION

- A. The United States Department of Agriculture, Agricultural Research Service, and the Stuttgart/Pine Bluff Location (**SPBL**), which consists of the Aquaculture Systems Research Unit (ASRU, 1500 Oliver Road, Pine Bluff, AR 71601), the Dale Bumpers National Rice Research Center (DB NRRC, P.O. Box 1090, Stuttgart, AR 72160), and the Harry K. Dupree Stuttgart National Aquaculture Research Center (SNARC, P.O. Box 1050, Stuttgart, AR 72160) are committed to the ideals of maintaining the highest safety, health, and environmental standards when using radioactive material and x-ray producing equipment.
- B. The general intent of this plan is to:
 - 1. Comply with the rules and regulations governing radioactive materials use. Chief among these are:
 - a. 10 Code of Federal Regulations (CFR), Energy.
 - b. 29 CFR 1910.96, Ionizing Radiation.
 - c. License 19-00915-03, expiration date 9/30/2005, issued by the Nuclear Regulatory Commission (NRC) to the USDA.
 - 2. The license specifies what USDA radiation permit holders are allowed to do.
 - 3. If an activity is not specifically allowed under the license, we can assume that it is prohibited until we receive written guidance from the USDA Radiation Safety Staff (RSS) to the contrary.
 - 4. USDA Permit Conditions and standard operating conditions, found in the *USDA Radiation Safety Handbook*.
 - 5. Although the USDA is not legally required to meet State requirements, the USDA practices a 'good tenant' policy and seeks to meet State standards and to maintain a good working relationship with State regulators. In most cases, state regulations mirror Federal regulations.

6. Protect Location employees from internal and external health hazards associated with the use of radioisotopes in our laboratory.
7. Identify, assess, and control potential radiation exposures at the Location, to ensure that SNARC employees are not exposed to radioactivity in excess of the permissible exposure limits as defined in 10 CFR 20 and 29 CFR 1910.96.
8. **Steven D. Rawles** (870-673-4483 x249) is the designated as Location Radiation Protection Officer (LRPO) for the **SPBL**.
9. This plan will be available for all employees to review, and copies will be located in the libraries of the DB NRRC (the central resource library for the **SPBL**) and SNARC as well as in the office of the LRPO located in the Fish Nutrition Laboratory, Room 112, SNARC.
10. The plan will be reviewed annually by the LRPO and will be updated as appropriate.

II. REFERENCES

- A. 10 CFR, Energy
- B. 29 CFR 1910.96, Ionizing Radiation
- C. NRC License 19-00915-03
- D. USDA RSS Permit Conditions (found in Appendix 6.1 and on the RSS web page: www.usda.gov/da/shmd/rss1.htm)

III. DEFINITIONS - For the purpose of this plan, the following definitions will apply:

- A. Associate User: An individual who is working with radiation sources under the terms and conditions of a radiation source permit, under the general supervision of the Permit Holder.
- B. Hazards, Radiation: Radiation hazards are usually divided into two categories - external and internal:
- C. External radiation hazards are those presented by a radiation source that is external to the human body. These are usually controlled by limiting the time personnel are exposed to radioisotopes, maximizing the distance between personnel and radioisotopes, and/or shielding the radiation sources. The LRPO can give consultation on specific questions that may arise regarding control of external radiation hazards. Verification that external radiation hazards are under control is achieved by:
 1. Surveys of operations and facilities performed or coordinated by the LRPO and Permit Holder to determine compliance with RSS Permit

conditions. The time interval of these surveys depends upon RSS Permit Conditions for the given operation.

2. Wipe tests performed or coordinated by the LRPO and Permit Holder of rooms in which radioisotopes are used. The time interval of these tests depends upon RSS Permit Conditions for the given operation.

D. Internal radiation hazards are those presented by a radiation source that has entered the human body. These are usually controlled by preventing inhalation, ingestion, or absorption of radioactive contaminants into the body. Examples of such controls include performing operations with volatile radioactive materials under the fume hood (preventing inhalation), prohibiting food or drink in the laboratory (preventing ingestion), and using shields or wearing protective apparel while handling radioisotopes (preventing absorption). Verification that internal radiation hazards are under control is achieved by:

1. Audits performed or coordinated by the LRPO and Permit Holder to determine that personnel are following appropriate procedures in handling radioisotopes or X-ray producing equipment.
2. Monitoring of personal dosimeter results on a monthly basis by the LRPO to verify that employees are not receiving excessive or unnecessary radiation doses.
3. If specific situations are encountered (such as radioiodinations) and it is judged by the LRPO to be appropriate to conduct bioassay tests, such tests will be performed as appropriate. No radioiodination experiments can be conducted without prior consultation with and approval by the LRPO and Area Safety and Health Manager (ASHM).

E. Permit Holder: An individual authorized to possess and use radioactive materials or x-ray producing equipment at a USDA location, and who is responsible for their safe and proper use. The term "Permit Holder" replaces and supersedes previously used titles such as "Independent User", "Authorized User", and "Principle Investigator".

F. RSS Permit Conditions: The instructions and requirements for specific operations (e.g., using electron capture detectors, handling unsealed radioactive materials, and disposing of radioactive waste) published by the RSS. The RSS Permit conditions for SNARC are contained in Appendix 6.1 of this Plan and on the RSS web page: www.usda.gov/da/shmd/rss1.htm.

IV. RESPONSIBILITIES

- A. The Radiation Safety Staff (RSS), located 5601 Sunnyside Avenue Mail Stop 5510, Beltsville, MD 20705-5000, phone 301-504-2440/2444/2445/2447 is responsible for:
1. Serving as Agency contact on matters involving radioactive materials and X-ray producing equipment.
 2. Prescribing specific radiation safety measures, rules, and procedures.
 3. Maintaining records of the purchase, receipt, use, transfer, and disposal of radioactive material and X-ray producing equipment.
 4. Conducting inspections of the facilities and operations of locations that use radioactive material and/or X-ray producing equipment.
 5. Preparing formal reports as required by licensing requirements.
 6. Maintaining liaison with agency safety officials.
 7. Providing assistance on radiation safety matters to locations that use radioactive material and/or X-ray producing equipment.
 8. Staying abreast of current regulations involving radioactive materials and X-ray producing equipment.
- B. The Location Coordinator
Current LC is Don Freeman
1. Approves, by signature, this plan.
 2. Authorizes and supports the implementation of this plan, the annual review of this plan, and amendments or changes to this plan.
 3. Provides resources for training, equipment, and other support called for in this plan.
 4. Reviews initial and renewal requests for radiation source permit applications.
 5. Appoints LRPO.
 6. Assures Permit Holders have appropriate safety elements in their Performance Plans and job descriptions.
 7. Ensures the prompt abatement of hazardous conditions.
- C. Research Leaders, lead scientists, and department heads will:

- a. Ensure employees under their jurisdiction comply with provisions of this plan.
 - b. Ensure that technical support personnel have received proper training prior to initiating operations involving radioactive materials or radiation emitting devices.
 2. Correct work errors or conditions that may result in violations of the USDA permit.
 3. Notify the LRPO and maintenance personnel when equipment or facilities critical to radiation safety are inadequate or are not performing according to specification.
- D. The LRPO acts in consultation with Location management and the RSS, and:
1. Maintains files and records of program activities.
 2. Maintains this plan.
 3. Publicizes this plan.
 4. Maintains records of personnel dosage for employees who are or may be working with/near radiation producing sources.
 5. Maintains records of monthly facility radiation inspections.
 6. Forwards facility radiation survey reports to the RSS on a quarterly basis.
 7. Maintains records of correspondence between the Location and RSS.
 8. Coordinates disposal of all radioactive waste, including that through outside contractors if and when appropriate.
 9. Assures that personal dosimeter radiation film badges are distributed at the beginning of each month to personnel who request or require them, are collected at the end of each month, and are forwarded to the contractor for analysis.
 10. Monitors monthly personnel dosimeter reports of personnel who request or require personal dosimeter radiation film badges.
 11. Serves as a source of advice and counsel to all employees at the Location on issue involving radiation safety and license compliance.
 12. Provides or arranges appropriate training for employees regarding radiation hazards, controls, and emergency procedures at SNARC.

13. In consultation with the Southern Plains ASHM, reviews this plan annually and monitors its effectiveness.

NOTE: The LRPO does not assume responsibilities that are assigned specifically to Permit Holders. Each Permit Holder and Associate User at SNARC is charged with assuring that he or she conducts all research in full compliance with Agency, Department, and Nuclear Regulatory Commission rules and guidelines.

E. The Permit Holder:

1. Performs radiation operations in accordance with the RSS Permit Conditions and NRC rules and guidelines.
2. Maintains current inventory of ionizing radiation sources in the Location under his/her control.
3. Maintains appropriate authorizations and approvals as required from the RSS.
4. Maintains records of use, transfer, and disposal of radioactive materials used in his/her laboratory.
5. Performs surveys and inspections in accordance with RSS Permit Conditions and in coordination with LRPO.
6. Performs appropriate dosimetry monitoring of personnel who work with radioisotopes or X-ray producing equipment.
7. Assures proper labeling, storage, use, transfer, and disposal of radioactive materials.
8. Assures proper signage and security in laboratories or other areas where radioactive materials and/or X-ray producing equipment are in use.
9. Assures personnel wear appropriate personal protective equipment and have received proper training prior to initiating operations involving radioactive materials or X-ray producing equipment.

Note: Although the above responsibilities reside with the individual Permit Holder and Associate User, the LRPO is committed to work with each Permit Holder and Associate User to assure full compliance and smooth operation. Any individual at the Location should feel free to call on the LRPO at any time if questions or concerns arise. In addition, any employee should feel free to contact RSS personnel directly with any problems or concerns.

The Associate User shall follow the directions of the Permit Holder in matters of radiation operations.

USDA-WIDE PROGRAM ELEMENTS: The RSS has issued Permit Conditions, Technical Bulletins, and Forms that guide and govern USDA radiation operations under the NRC license. They are found in the USDA Radiation Safety Handbook, a copy of which is located in the Fish Nutrition Lab, Room 112, SNARC.

F. Permit Conditions have been issued for the following subjects:

1. Electron capture detectors
2. Electron microscopy facilities
3. General research using radioactive materials
4. Iodine-125 bioassay and effluent monitoring
5. Moisture/density gauges
6. Personnel dosimetry
7. Self shielded irradiators
8. Tritium bioassay and effluent monitoring
9. X-ray producing equipment

G. Technical Bulletins have been issued on the following subjects:

1. Determining lower limit of detection and minimum detectable activity for radiation measurements
2. Performing close-out surveys in radioisotope laboratories
3. Radiation safety considerations for the Declared Pregnant Woman
4. Radioactive waste management

H. Forms have been issued for the following activities:

1. Application to use:
 - a. Radiation producing sources
 - b. Radioactive materials use
 - c. Nuclear gauges
 - d. Electron capture detectors
 - e. Self-shielded irradiators
 - f. X-ray producing equipment

2. Inventory records for:
 - a. Sealed sources
 - b. X-ray producing equipment
3. Worksheets for:
 - a. Tritium bioassay
 - b. Thyroid bioassay
 - c. Radioactive iodine effluent monitoring
 - d. Contamination survey
 - e. Instrument efficiency for I-129 standards
 - f. Thyroid bioassay instrument efficiency
4. Dosimetry:
 - a. Service request
 - b. Additions to dosimetry service
 - c. Deletion or change request
 - d. Visitor dosimetry assignment report

V. SNARC-SPECIFIC PROGRAM ELEMENTS: All SNARC operations involving radioactive materials or X-ray emitting devices will conform to RSS Permit Conditions, Technical Bulletins, and Forms. The following activities are in support of those conditions and are specific to activities at SNARC:

- A. Electron Capture Detectors (ECDs).
 1. SNARC use of electron capture detectors shall conform with RSS *Permit Conditions for Electron Capture Detectors*. This document is appended to this plan as Appendix 6.2.
 2. The SNARC ECD(s) is/are used in the SNARC Chemistry Lab, Room 128,. When not in a gas chromatograph, the detector cells shall be kept locked in the SNARC Chemistry Lab, Room 128.
 3. Transfer or disposal of ECDs will only be performed with the coordination of the LRPO and the foreknowledge and written approval of the RSS.
 4. If an ECD is lost or stolen, the Permit Holder or Associate User must notify the RSS, LRPO, and ASHM immediately.
- B. General Use of Check Sources, Calibration Standards, Small Sealed Sources, and Unsealed Radioactive Materials.

1. SNARC's use of radioactive materials for general research shall conform with RSS *Permit Conditions for General Research Using Radioactive Materials*. This document is appended to this plan as Appendix 6.3.
2. Radioactive materials for general research are located in SNARC Fish Nutrition Lab Room 112 and Physiology Lab Room 126. Radioactive materials in these rooms will be stored in appropriately shielded storage boxes secured within designated refrigerators/freezers. These storage boxes shall be kept locked and secured within refrigerators/freezers when radioactive materials are not under the immediate supervision or use of the Permit Holder or Associate User. Furthermore, rooms 112 and 126 shall be kept locked to prevent unauthorized entrance if unattended during periods that radioactive materials are actively being used.
3. Transfer or disposal of radioactive materials for general research will only be performed with the coordination of the LRPO and the foreknowledge and written approval of the RSS.
4. Immediately notify the LRPO after the theft or loss of radioactive materials for general research is discovered. The LRPO shall notify the RSS, appropriate regulatory agencies, and police, as required by the Permit Conditions for the situation.

C. Iodine-125 Bioassay and Effluent Monitoring.

1. SNARC use of Iodine-125 for bioassay and effluent monitoring shall conform with RSS *Permit Conditions for Iodine-125 Bioassay and Effluent Monitoring*. This document is appended to this plan as Appendix 6.4. Use of Iodine-125 labeled compounds at SNARC is currently limited by permit (see Appendix 6.1) to total quantities and activities below those requiring Iodine-125 Bioassay and Effluent Monitoring.
2. No radioiodination experiments may be conducted without prior consultation with and approval by the LRPO, the Southern Plains ASHM and the RSS. Radioiodination experiments are not approved for SNARC under the current RSS permit.
3. Iodine-125 materials are located in the SNARC Physiology Lab Room 126. Iodine-125 materials in Room 126 will be stored in appropriately shielded storage boxes secured within designated refrigerators/freezers. These storage boxes shall be kept locked and secured within refrigerators/freezers when Iodine-125 materials are not under the immediate supervision or use of the Permit Holder or Associate User. Furthermore, room 126 shall be kept locked to prevent unauthorized entrance if unattended during periods that Iodine-125 materials are actively being used.
4. Immediately notify the LRPO after the theft or loss of an Iodine-125 is discovered. The LRPO shall notify the RSS, appropriate regulatory

agencies, and police, as required by the Permit Conditions for the situation.

D. Personnel Dosimetry.

1. SNARC use of dosimeters to measure radiation dose shall conform with *RSS Permit Conditions for Personnel Dosimetry*. This document is appended to this plan as Appendix 6.5. Use of radioactive materials at SNARC is currently limited by permit (see Appendix 6.1) to total quantities and activities below those requiring the use of personnel dosimeters, however, see Sections V.D.2 - 5 below for special conditions.
2. Dosimeters are required for users of irradiators and neutron probes. Irradiators and neutron probes are not currently approved or anticipated for use at SNARC. Although SNARC expects no employee or visitor to be exposed to radioactive materials in excess of allowable dose limits, anyone working in or around radioactive materials may request inclusion in the dosimetry program.
3. Dosimeters may be requested by contacting the LRPO (see Section I.B for contact information).
4. USDA policy dictates that radiation operations shall be designed and performed in a fashion to keep employee exposure to radioactivity As Low As Reasonably Achievable (ALARA). 10 CFR 20 and 29 CFR 1910.96 limit radiation exposure to the following:
5. Whole body; head and trunk; active blood forming organs - 5 rems per year.
 - a. Hands and forearms; feet and ankles; extremities - 50 rems per year.
 - b. Lens of eye - 15 rems per year.
6. Exposure to individuals under eighteen (18) years of age shall not exceed one-tenth the above levels.
7. Prenatal Exposure
 - a. Additional dosimetry conditions are required for declared pregnant workers. The LRPO and the *RSS Technical Bulletin Radiation Safety Considerations for the Declared Pregnant Woman* should be consulted for these.
 - b. Pregnant women or women of childbearing age shall receive special training (prior to initiation of work with radioisotopes or

X-ray producing equipment regarding prevention of fetal exposure to radiation.

- c. Exposure of pregnant women to radioactivity shall not exceed 0.125 rem during the entire gestation period.
- d. The National Council on Radiation Protection (NCRP) recommends keeping prenatal exposure below 0.5 rem during the gestation period. This is required by 10 CFR 20.
- e. The USDA's Radiation Safety Committee requires that prenatal exposure be kept ALARA, and in no case shall it exceed twenty-five percent (25%) of the NCRP's 0.5 rem limit, or 0.125 rem, during the gestation period.

8. Disposal of Radioactive Waste.

- a. SNARC's radioactive waste activities shall conform to RSS Technical Bulletin, *Radioactive Waste Management*.
- b. Burial of radioactive waste on the grounds of SNARC or any USDA facility is forbidden.
- c. Disposal of Short Half-life Materials by Decay-in-Storage
- d. All decay-in-storage activities shall be done with the foreknowledge and coordination of the LRPO.
- e. Radioactive waste materials with half-lives of 120 days or less shall be segregated and held for a minimum of ten half-lives for decay.
- f. During the decay period, the material shall be placed in containers that prevent or contain spills and held in a secured and shielded area, approved or designated by the LRPO. The Radiological Waste Shed located in the SNARC Chemical Bunker B is designated as the site for decay-in-storage of Iodine-125 waste.
- g. During decay-in-storage, all signage, label, and survey requirements of the RSS shall be complied with.
- h. After the ten half-life decay period has elapsed, the material shall be surveyed to determine if its radiation level is indistinguishable from background. Once its radiation is indistinguishable from background, the material may be disposed of as normal waste, after all radiation labels have been removed or obliterated.

- i. All radioactive waste disposal shall be documented by the Permit Holder in accordance with RSS documentation requirements.
- 9. Dry, Solid Waste
 - a. Dry solid radioactive waste (lab trash, soil, vegetation) shall not contain visible liquids, lead pigs, or biological hazards.
 - b. Solid waste containers shall be sturdy and marked "Caution Radioactive Materials".
 - c. Solid waste containers shall be properly marked as to date, researcher, contents, and activity.
 - d. Deliver the container to the LRPO for storage and ultimate disposal.
 - e. All radioactive waste disposal shall be documented by the Permit Holder on Form AD-801 (attached as Appendix 6.6).
- 10. Disposal of Liquid Scintillation Vials Containing Scintillation Cocktail
 - a. SNARC researchers may not use "hazardous" scintillation cocktail, as defined below; without prior consultation and approval of the LRPO.
 - b. To be categorized as "non-hazardous", scintillation cocktail must meet ALL of the following requirements:
 - c. It may contain no more than 0.05 microCurie (μCi) per gram of hydrogen-3 and/or carbon-14. Dilution may be used to achieve this level of activity.
 - d. It may not contain gamma emitters or higher energy beta emitters.
 - e. It must be identified as biodegradable and non-hazardous by its manufacturer.
 - f. It may not contain xylene, toluene, or other solvents with Environmental Protection Agency disposal restrictions. Cocktails identified as biodegradable and non-hazardous meet this requirement.
 - g. To be categorized as "hazardous", scintillation cocktail need only meet one, or any combination, of the following conditions:

- h. Its activity is greater than 0.05 μCi of any radioisotope per gram of cocktail.
- i. It contains gamma emitters or beta emitters other than hydrogen-3 or carbon-14.
- j. It is not positively identified as biodegradable or non-hazardous by its manufacturer.
- k. It contains xylene, toluene, or other solvents with Environmental Protection Agency disposal restrictions. Cocktails not labeled as biodegradable and non-hazardous shall be assumed to contain one of more of these solvents that have disposal restrictions.
- l. Disposal of either "non-hazardous" or "hazardous" liquid scintillation cocktail and vials via contract disposal.
- m. Leave the vials intact, and place them in an appropriate box or bag, labeled as to researcher, date, isotope present (C-14, H-3, or both), type of cocktail (non-hazardous or hazardous), and certified that they contain on average less than 0.05 μCi per gram of cocktail of C-14 and/or H-3.
- n. Deliver the box or bag of vials to the LRPO who will transport them to SNARC Chemical Bunker B for temporary secured storage until ultimate disposal by contract hauler.
- o. Drain disposal of "non-hazardous" liquid scintillation cocktail and vials is NOT allowed at SNARC.
- p. Disposal of scintillation cocktail from HPLC-linked radioisotope detectors
- q. Effluent from HPLC radioisotope detectors shall be treated as liquid scintillation cocktail vial waste subject to the same restrictions described above.
- r. This liquid shall be transferred to liquid scintillation cocktail vials, capped securely, labeled as above, and delivered to the LRPO for disposal as liquid scintillation cocktail vial waste.

11. Disposal of Liquid Waste

- a. It is laboratory policy that the generation and accumulation of organic liquid radioactive waste (i.e., containing organic solvents) be minimized to the extent possible. Researchers should, where possible, remove organic solvents by vacuum distillation, disposing of the solvent waste as normal (non-

radioactive) hazardous waste and disposing of the radioisotopes by accepted techniques (sanitary sewer system, dissolved in water or other acceptable media).

- b. Organic liquids and aqueous liquids shall be kept segregated from each other and not mixed.
- c. Liquid containers shall be sturdy and properly marked as to date, researcher, contents, and activity. The containers shall be marked "Caution Radioactive Materials".
- d. Liquid organic waste identified for disposal shall be delivered to the LRPO for disposal via contract hauler. Liquid radioactive waste may NOT be disposed of via SNARC laboratory sinks or on-site drains.
- e. Liquid aqueous wastes which are readily soluble or dispersible in water shall be delivered to the LRPO for disposal via contract hauler. Liquid radioactive waste may NOT be disposed of via SNARC laboratory sinks or on-site drains.

12. Disposal of Animal Tissue

- a. Assumptions and Expectations
- b. It is expected that animal tissue will only be contaminated with hydrogen-3 and/or carbon-14. If a Permit Holder expects to use other radioisotopes in an experiment involving animal tissue, the Permit Holder must coordinate with the LRPO and RSS prior to beginning the experiment.
- c. It is expected that experimental processes at SNARC will not result in animal carcasses being contaminated with more than 0.05 μCi per gram of hydrogen-3 and/or carbon-14, averaged over the weight of the entire animal. If the Permit Holder expects an experiment to exceed this threshold, the Permit Holder must coordinate with the LRPO and RSS prior to beginning the experiment.
- d. Animal tissue containing not more than 0.05 μCi per gram of hydrogen-3 and/or carbon-14, averaged over the weight of the entire animal, may be disposed of without regard to its radioactivity; however, other nonradioactive hazards may restrict the disposal of the tissue.
- e. Animal tissue, in any case, must be disposed of in a fashion to prevent its use as food for either humans or animals.

f. Off-site disposal

- ◆ It is laboratory policy that all animal tissue containing not more than 0.05 μCi per gram of hydrogen-3 and/or carbon-14 (averaged over the weight of the entire animal) shall be disposed of by contract hauler.
- ◆ If off-site disposal is anticipated, the Permit Holder must coordinate with the LRPO prior to beginning the experiment.
- ◆ On-site disposal of radiological waste is NOT permitted at SNARC.
- ◆ All radioactive waste disposal shall be documented by the Permit Holder on Form AD-801 (attached as Appendix 6.6).
- ◆ Immediately notify the LRPO after the theft or loss of radioactive waste is discovered. The LRPO shall notify the RSS, appropriate regulatory agencies, and police, as required by the Permit Conditions for the situation.

VI. MEDICAL CONSULTATION

- A. Should personnel monitoring indicate that an employee has been potentially exposed to hazardous levels of radiation, or should an event take place in the work area that could potentially expose employees to hazardous levels of radiation (spill, leak, explosion, etc.), or should an employee develop signs and symptoms associated with radiation exposure, the employee shall be provided the opportunity to receive appropriate medical examination through the Chemical Hygiene Program (CHP). All CHP-related medical examinations and consultations are provided by our OMSP contractor, Stuttgart Regional Medical Center, N. Buerkle Rd; P.O. Box 1905, Stuttgart, AR (870-673-3511). These examinations are provided without cost to the employee, without loss of pay, and at a reasonable time.
- B. If a work-related illness or injury is apparent the employee may file a Workers' Compensation claim, in which case medical services are provided by a physician of the employee's choice.
- C. The LRPO (or responsible supervisor) will provide the following information to the physician:
1. Identity of the radioisotopes to which the employee may have been exposed.

2. A description of the conditions of the exposure including exposure date if available.
- D. A description of signs and symptoms of exposure that the employee is experiencing (if any).
- E. If an internal exposure to radiation has occurred, the LRPO must notify the RSS and the ASHM immediately.
- F. Questions about the OMSP or workers' compensation program may be directed to the Personnel Specialist at the Area Administrative Office, 409-260-9443 or by contacting the CDSO (Diana Morian, 870-672-9300 x274).

VII. EMERGENCY PREPAREDNESS

- A. Section 4.4 of the USDA Radiation Safety Handbook contains guidance for handling a variety of radiation emergencies.
- B. SNARC Assumptions
1. In radiation emergency situations, the safety of humans (Location personnel, neighbors, and the surrounding community) is paramount.
 2. Given the scale of radiation operations at SNARC, it is unlikely that a radiation emergency will spread beyond laboratory property lines.
- C. Location personnel will perform their duties and will respond to radiation emergency situations in a logical and reasonable manner consistent with their expertise and consistent with what would be expected of any reasonable private company employee, private citizen, or good neighbor.
- D. Location personnel are not trained, nor do they have experience in handling large scale radiation emergencies.
- E. The handling of radiation emergencies, including designations of authority, preplanning, liaison with outside emergency response agencies, and communications, shall be accomplished under the general procedures outlined in the Location Facility Self Protection Plan.
- F. Arkansas Radiation Control and Emergency Management Program (501-661-2301) is the action agency for handling large scale radiation emergencies that require support or equipment not available at the Location.
- G. In responding to a radiation emergency, the following factors should be addressed:
1. Assist People First.

- a. Ensure that individuals who receive radiation exposure get immediate attention.
 - b. Monitor other individuals in the immediate area to determine if they have been contaminated.
 - c. Remove non-essential personnel from the area.
 - d. Require response personnel to wear appropriate personal protective equipment, including gloves, and outer garments if appropriate.
 - e. Given the nature and relatively small quantities of radioisotopes used at the Location, simply maintaining a distance of twenty or more feet from the contaminated area will generally be the best approach toward minimizing exposure.
2. Stabilize the situation.
- a. Identify the hazards.
 - b. Identify the radioisotope(s) involved and the approximate activity level.
 - c. Identify associated hazards (e.g., was the radioisotope mixed with a volatile solvent, what is the flammability of the materials involved, is there a chance for an explosion, are there any other operations in the area which may be hazardous to emergency response personnel, etc.).
 - d. Define the area of contamination.
 - e. Limit personnel access to area.
 - f. Use ropes or barricades to identify the area of contamination. Limit traffic into and out of the area to prevent the spread of contamination.
 - g. Shield the area if appropriate. Shielding beta particles is relatively simple; however, shielding gamma or X-radiation is complex and should not be attempted without thorough knowledge. The LRPO can give assistance.
 - h. Initiate cleanup or control activities.
3. If a fire is involved, the Permit Holder shall:

- a. Notify the fire department and LRPO as soon as possible.
 - b. Take action appropriate to the situation to protect personnel and emergency responders.
 - c. Stand by to assist fire fighters as to the nature, location, and potential hazards of radioactive materials.
 - d. Melting points:
 - (1) Stainless steel - 2550°F (1400°C)
 - (2) Carbide - 2000°F (1090°C)
 - (3) Aluminum - 1005°F (540°C)
 - (4) Lead - 620°F (327°C)
 - (5) Polyethylene - 257°F (125°C)
4. Notify proper authorities:
- a. Location Radiation Protection Officer (**Steven Rawles**, 870-673-4483 x249)
 - b. Research Leader\Center Director (**Donald W. Freeman**, 870-673-4483 x269)
 - c. Radiation Safety Staff (301-504-2440, -2444/2445/2447)
 - d. Arkansas Radiation Control and Emergency Management Program (501-661-2301)
 - e. Fire Department (911)
 - f. Nuclear Regulatory Commission (817-860-8100)
 - g. Area Safety & Health Manager or Area Director (Phil Smith, 409-260-9343)

Note: Unless prudence or the nature of the emergency dictates otherwise, authority notification will usually proceed in the order listed above, with an informed judgement being made at each level as to the appropriateness of notifying the next level.

VIII. EMPLOYEE INFORMATION AND TRAINING

- A. Refer to the SOP for ordering Radioactive Material. Copies of the RSS-83 are no longer sent to the LAO office. It is only necessary to record the RSS approval number on the AD-700 sent to the LAO office which documents their authority from RSS to obligate funds for a specific RAM order. RSS-83 is specifically to document cradle to grave use and disposal of RAM amounts. Those records ultimately reside with the LRPO. It is the responsibility of permitted users to keep up with RAM amounts used in assays and disposed of by permitted processes and to inform RSS of said changes to RAM inventory.
- B. In addition to the initial training the RSS requires before granting a use permit, SNARC employees working with radiation or X-ray producing equipment will be provided with Location-specific information and training, so that they are

acquainted with the hazards of radioisotopes. This training will be performed as soon after the time of initial assignment as practicable and prior to new assignments. Refresher training will be given annually or as needed.

C. Training will consist of:

1. The contents of 10 CFR 20 and 29 CFR 1910.96 as they apply to SNARC operations.
2. The requirements of the RSS Permit Conditions for the operations conducted by the employees.
3. The availability, location, and contents of the SNARC written Radiation Protection Plan.
4. The physical and health hazards of radioisotopes in the laboratories.
5. Signs and symptoms associated with exposure to radioisotopes in the laboratories.
6. Methods to detect the presence or release of radioisotopes in the laboratories.
7. Location of reference materials regarding the safe handling of radioisotopes in the laboratories.
8. Measures to protect employees from radiation hazards, including:
 - a. Standard operating procedures
 - b. Work practices
 - c. Emergency procedures
 - d. Shielding
 - e. Personal protective equipment

D. The LRPO is responsible for conducting or arranging for the training sessions.

E. Employee radiation safety training will be documented.

IX. INSPECTION & REVIEW PROGRAM

- A. The LRPO will perform an inspection and program review at least annually to determine radiation safety program compliance.

1. The inspection will verify that engineering controls, protective equipment, SOPs, workplace monitoring, and other aspects of the SNARC radiation safety program are effective in preventing employee exposure to radioisotopes.
 2. The review of the written program will determine the adequacy of the current SNARC program and whether changes, updates, or improvements are needed.
- B. A copy of the inspection and review will be given to the Location Coordinator for correction of any discovered inadequacies or noncompliance.
- C. Copies of annual inspections will be kept in the libraries of the DB NRRC (the central resource library for the **SPBL**) and SNARC as well as in the office of the LRPO located in the Fish Nutrition Laboratory, Room 112, SNARC.

X. RECORD KEEPING AND REPORTING

- A. Record keeping requirements for radioactive materials/equipment purchase, transfer, disposal, dosimetry, surveys, leak tests, and training are contained in the RSS Permit Conditions that govern the materials/equipment.
- B. In addition to the RSS-required records, the following records will be kept:
1. Program activities and meeting minutes.
 2. Annual inspections and program reviews.
- C. Records will be kept by the LRPO in the SNARC Fish Nutrition Lab, Room 112, free for employee review.

APPENDIX 6.1

RSS Permit conditions For SNARC Operations

APPENDIX 6.2

APPENDIX 6.3

APPENDIX 6.4

APPENDIX 6.5

APPENDIX 6.6